

than geographical causes. According to M. Eug. Dubois¹ one obscure enigma is that relating to the glacial episode which has been recognised in parts of India, Australia and South Africa in Permo-Carboniferous times. In those subtropical regions the débris from snow-clad mountains had been able to reach sea-level and be commingled with organic remains of almost tropical character. Other evidence, however, tends to show that there was no general lowering of temperature in this ancient epoch, but that there must locally have been mountains of considerable altitude, and that meteorological conditions were favourable to the development of huge glaciers. So also in the case of the far earlier pre-Cambrian period, during which it is believed that glaciation occurred. In connection with the phenomena M. Dubois discusses the evolution of the sun and the various influences affecting radiation of heat, maintaining that the general evidence of higher and more uniform temperature over the earth's surface prior to middle Tertiary times is well established, and is not interfered with by evidences of extensive though restricted glaciation.

In drawing attention to the influence of winds upon climate during the Pleistocene epoch (*Quart. Journ. Geol. Soc.*, August 1901), Mr. F. W. Harmer has opened up inquiries of considerable and far-reaching interest. Remarking that seasons abnormally warm or cold, rainy or dry, may be caused by the prevalence of particular winds, though the course of the oceanic circulation remain the same, he justly remarks that permanent alterations would equally result were the direction of the prevalent winds permanently changed.

Having attentively studied the causes and influence of areas of high and low pressure, he concludes that the climate of the northern hemisphere could not have been wholly cold during any part of the Pleistocene epoch, and that consequently the period of maximum glaciation in North America could not have coincided with that which affected the British Isles.

Regions covered by ice would have been to a greater or less extent anticyclonic at all seasons, low pressure systems prevailing elsewhere. The northerly winds on one side, either of a cyclonic or an anticyclonic centre, are the necessary equivalent of the southerly winds on the other, the direction in the northern hemisphere in the case of the anticyclone being like that of the hands of a watch, and in the case of a cyclone in the opposite direction.

Thus the effect of the anticyclone of an ice-sheet extending eastward from Greenland, over Great Britain, Scandinavia, and Northern Europe, would have been to change the prevalent alignment of the low-pressure system of the North Atlantic, producing warm south-easterly winds in Labrador and New England during the winter, instead of the northerly winds now prevalent there. The alteration in the direction of the winds would have tended, moreover, to divert the warm surface-currents of the North Atlantic from the European to the American coast.

It is admitted by Mr. Harmer that the maximum glaciation of Great Britain could only have taken place at a time when the Icelando-British channel was closed, either by an elevation of the submarine ridge connecting those countries or by its being blocked with ice. Thus, although the winds have naturally a most powerful influence, which he has done good service in pointing out, he is led to consider that to differential earth-movements of elevation and subsidence in different parts of the northern hemisphere may have been due the suggested shifting of glacial conditions from one side of the Atlantic to the other, and the alternation of glacial and interglacial periods in the eastern and western continents.

¹ "Les Causes probables du Phénomène paléoglacière permo-carboniférien dans les basses latitudes." *Archives Teyler*, vii., Partie 4. (Haarlem, 1901.)

In this way the milder periods which locally prevailed at intervals during the Pleistocene epoch would be attributed to meteorological and geographical rather than to astronomical causes.

ANIMAL PHOTOGRAPHY.¹

THE advantages of photography as compared with wood-engraving for the illustration of works on natural history are in many ways so great that any attempt to perfect and popularise the methods in use should be heartily welcomed. Quite apart from artistic effect, the great superiority of photography is that it ensures absolute accuracy, and, when living animals are the subjects, shows them in natural attitudes. In wood-engraving there are several sources of error which only too frequently make themselves apparent. In the first place, the draughtsman may make a blunder. But too often it is the engraver who is in fault, very frequently from mistaking the nature of some feature in the drawing he has to reproduce. For example, the author of the volume before us calls attention to a curious engraver's error in a well-known popular work, where, from some misconception, the mouth of a stickleback appears in a totally wrong position.

Such errors are, of course, impossible in photographs and photogravures. Nevertheless, photography has



FIG. 1.—Hedgehog.

certain disabilities of its own in regard to animal portraiture. A trained zoological draughtsman, whose object should be to produce a *characteristic* rather than an *artistic* picture, always takes care to draw his subject in a position which will show to the best advantage its distinctive features, whether of form or colour, and for this purpose he generally consults the specialist for whom the sketch is undertaken. The photographer, on the other hand, is usually content to "snap" the animal he has in hand in any effective pose, with the too frequent result that his picture, from a zoological point of view, has comparatively little value. That is to say, the features by which alone the affinities of the animal can be decided are either not shown at all, or are but imperfectly displayed.

One of the main objects of the present work appears to be to instruct photographers how to avoid these effects

¹ "Photography for Naturalists." By D. English. Pp. 132. Illustrated. (London: Iliffe, 1901.) Price 5s. net.

As a case in point, the author takes the natterjack toad. "There are three particular features about the natterjack toad," he writes, "which distinguish it from the commoner variety. It has a yellow stripe down its back, its hind feet are not webbed, and it has a peculiar running method of progression. A really good illustration of this toad would show these three distinctive features. A photograph might easily be produced which would show none of them—a side view, for instance, of the toad sitting still—and such a photograph would probably be the one taken by a photographer who had not troubled to make himself acquainted with his subject."

The author then proceeds to show the methods necessary in order to procure the desired results. Elsewhere he states that for photography of this description the only satisfactory way is to keep the animals whose portraits are desired in confinement for some little time, when they soon become sufficiently tame not to mind the approach of the artist with his camera. It will, of course, be obvious in this connection that the photographer must either be a good practical naturalist himself, or that he must consult someone duly qualified to point out the characteristic features of the animals about to be taken.

Not less important than the display of an animal's distinctive structural peculiarities is the reproduction of its characteristic attitudes. In this respect nature fortunately comes to the artist's assistance. "Living creatures," as the author truly observes, "adopt their

labour in this field will probably ere long produce a sufficiency. For scientific zoology the portraits of rare foreign animals are still more essential; and in a future edition it may be hoped that the author will see his way to urging his fellow-workers to take up this part of the subject in real earnest.

A large portion of the work is, of course, devoted to the *technique* of the subject; but this we may well leave to the consideration of practical photographers.

The author has done good service in endeavouring to impress on his fellow-workers the importance of producing animal portraits which shall satisfy the requirements of zoologists, and we sincerely trust that his efforts to promote improvement in these matters will not be in vain. The book should be in the hands of every photographer as well as of every naturalist.

R. L.

NOTES.

THE Royal Society's medals have this year been adjudicated by the president and council as follows:—The Copley Medal to Prof. J. Willard Gibbs, For. Mem. R.S., for his contributions to mathematical physics; a Royal Medal to Prof. William Edward Ayrton, F.R.S., for his contributions to electrical science; a Royal Medal to Dr. William Thomas Blanford, F.R.S., for his work in connection with the geographical distribution of animals; the Davy Medal to Prof. George Downing Liveing, F.R.S., for his contributions to spectroscopy; and the Sylvester Medal to Prof. Henri Poincaré, For. Mem. R.S., for his many and important contributions to mathematical science. His Majesty the King has been graciously pleased to approve of the award of the Royal medals. The medals will, as usual, be presented at the anniversary meeting on St. Andrew's Day (November 30). The Society will dine together at the Whitehall Rooms on the evening of the same day.

The following is a list of those who have been recommended by the president and council of the Royal Society for election

into the council for the year 1902 at the anniversary meeting on November 30. The names of new members are printed in italics:—President, Sir William Huggins, K.C.B.; treasurer, Mr. A. B. Kempe; secretaries, Sir Michael Foster, K.C.B., and *Dr. Joseph Larmor*; foreign secretary, Dr. T. E. Thorpe, C.B.; other members of the council, Prof. H. E. Armstrong, *Mr. W. Bateson*, *Dr. W. T. Blanford*, *Prof. F. O. Bower*, Mr. C. V. Boys, *Prof. W. Burnside*, *Prof. W. W. Cheyne*, C.B., *Prof. G. C. Foster*, Prof. W. M. Hicks, *Mr. Frank McClean*, *Prof. H. A. Miers*, *Sir John Murray*, K.C.B., Prof. J. Emerson Reynolds, Dr. R. H. Scott, Prof. C. S. Sherrington, and Mr. J. W. Swan.

ON November 24 a medal will be presented to M. Berthelot, in the large amphitheatre of the Sorbonne, to commemorate his services to science. M. Berthelot's activity during more than fifty years has been extraordinary, and there are no branches of chemistry on which he has not made his mark. His last publication is "*Les Carbures d'hydrogène*," a work in three stately volumes, comprising an account of his labours on these compounds during the last half-century. To mention only some of M. Berthelot's achievements, his researches on the synthesis of the natural fats, his discovery of polyhydric alcohols, his work on explosives, on the fixation of nitrogen by plants, his long investigations in the domain of thermal chemistry, and the contributions which he has made to the history of chemistry, constitute a record of work which, it is not too much to say,

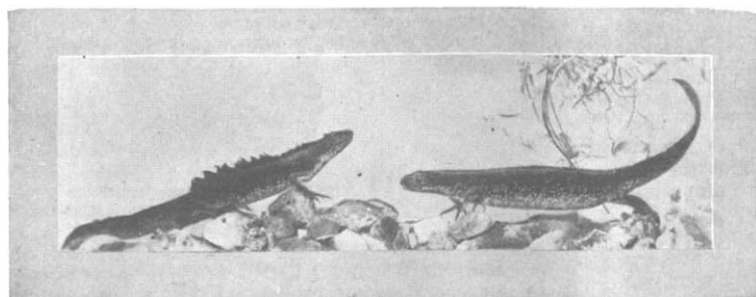


FIG. 2.—Male and Female Great Newts.

characteristic attitudes more frequently than any others. The photographer has, therefore, to learn which attitudes his subjects most frequently adopt, and should endeavour to perpetuate them in his store of negatives."

A third essential is to pay the greatest attention to the natural "accessories" of the animals photographed. In many cases this is a matter of extreme difficulty; and the artist is frequently sorely tempted to take his subject when in a favourable pose amid incongruous surroundings. Should this course have to be taken—and in some cases it is almost unavoidable—the author advises blocking out the animal and making a fresh negative with a suitable background.

Mr. English is careful to distinguish animal photography of the above nature from what he terms "stalking" photography, when the animal is approached stealthily in its native haunts with the camera, or the camera is concealed in a suitable position to await its arrival. And he renders full justice to the excellent results which have been obtained by the Messrs. Kearton in this branch of the subject.

In the main the author deals with British animals, of which he gives some exquisite pictures. Two of these, by the courtesy of the publishers, we are enabled to reproduce, so that our readers can judge for themselves as to their merits. While it is no doubt of the highest importance to have a large stock of life-like portraits of our native animals, the number of photographers who